

### REMARKS

In the Office Action, the Examiner objected to the drawings as allegedly failing to show every feature of the invention specified in claims 21-28. Applicants note that the matrix multiplications set forth in claims 21-28 are described at least in Table 1 and Table 2 on pages 7-8 of the specification. Thus, Applicants respectfully submit that the claimed subject matter is fully described in the specification and request that the Examiner's objections to the drawings be withdrawn.

New claims 28-36 have been added. No new matter has been added. Thus, claims 1-36 are pending in the present application. In the Office Action, the Examiner objected to claims 1, 2, 4, 8, 11, 15-18, 20, 22, 23, 27, and 28 because of a number of alleged informalities. The alleged informalities are addressed individually below.

With regard to claims 1, 2, 4, 8, and 11, Applicants have amended the claims to correct various typographical errors and to clarify the claim language. The claims have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the doctrine of equivalents. Applicant respectfully requests that the Examiner's objections to claims 1, 2, 4, 8, and 11 be withdrawn.

With regard to claims 15-17, the Examiner alleges that "a channel correlation coefficient" is not described in the body of the specification. Applicants respectfully disagree and note that a correlation of the reverse link channel, *i.e.* a channel correlation coefficient, is described in lines 22-32 on page 9 of the specification. With particular regard to claim 17, the Examiner alleges that there was insufficient antecedent basis for the channel correlation coefficient and auto-correlation coefficient. Claim 17 has been amended to correct a typographical error. The claims

have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the doctrine of equivalents. Applicants respectfully request that the Examiner's objections to claims 15-17 be withdrawn.

With regard to claim 18, the Examiner alleges there is insufficient antecedent basis for "the forward link transmitter." Claim 18 has been amended to correct a typographical error. The claims have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the doctrine of equivalents. Applicants respectfully request that the Examiner's objection to claim 18 be withdrawn.

With regard to claim 20, the Examiner alleges that the product limitation is unclear. Applicants respectfully submit that the claim accurately sets forth the desired limitation. The Examiner also alleges that there is insufficient antecedent basis for "the symbol signal" and "the incoming symbols." Claim 20 has been amended to correct these typographical errors. The claims have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the doctrine of equivalents. Applicants respectfully request that the Examiner's objection to claim 20 be withdrawn.

With regard to claim 22, the Examiner alleges that the phrases "a first complex number" and "a second complex number" are unclear because they are used multiple times in the same claim. Claim 22 has been amended to correct these typographical errors. The claims have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the

doctrine of equivalents. The Examiner also alleges that there is no antecedent basis for the claim in the body the specification. Applicants respectfully disagree and note that support for claimed subject matter be found at least in Table 1 and Table 2 on page 8 of the specification. Applicants respectfully request that the Examiner's objection to claim 22 be withdrawn.

With regard to claim 23, the Examiner alleges that the phrases "a second complex number" and "a fourth signal" are unclear because they are used multiple times in the same claim. Claim 23 has been amended to correct these typographical errors. The claims have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the doctrine of equivalents. The Examiner also alleges that there is no antecedent basis for the claim in the body the specification. Applicants respectfully disagree and note that support for claimed subject matter be found at least in Table 1 and Table 2 on page 8 of the specification. Applicants respectfully request that the Examiner's objection to claim 23 be withdrawn.

With regard to claim 27, the Examiner alleges that the phrases "a first phase" and "a second phase" are unclear because they are used multiple times in the same claim. Claim 27 has been amended to correct these typographical errors. The claims have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the doctrine of equivalents. The Examiner also alleges that there is no antecedent basis for the claim in the body the specification. Applicants respectfully disagree and note that support for claimed subject matter be found at least in Table 1 and Table 2 on page 8 of the specification. Applicants respectfully request that the Examiner's objection to claim 27 be withdrawn.

With regard to claim 28, the Examiner alleges that the phrases "a fourth signal" and "a fifth signal" are unclear because they are used multiple times in the same claim. Claim 28 has been amended to correct these typographical errors. The claims have in no way been narrowed by virtue of these amendments and so these amendments should not be interpreted as narrowing the claimed invention for purposes of any determination under the doctrine of equivalents. The Examiner also alleges that there is no antecedent basis for the claim in the body the specification. Applicants respectfully disagree and note that support for claimed subject matter be found at least in Table 1 and Table 2 on page 8 of the specification. Applicants respectfully request that the Examiner's objection to claim 28 be withdrawn.

In the Office Action, claims 6 and 17-19 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

With regard to claim 6, the Examiner alleges that the multiplication of a matrix by its own conjugate transpose would not be "negated" by taking the square root of such a result mathematically. Applicants respectfully disagree and note that, by definition, the matrix square root of the correlation matrix is the transformation matrix L.

With regard to claims 17-19, the Examiner alleges that one skilled in the art would be unable to determine the means to determine the value of the autocorrelation coefficient. Applicants respectfully disagree and submit that computing the autocorrelation coefficient of a signal is a standard procedure well within the abilities of a person of ordinary skill in the art.

For at least the aforementioned reasons, Applicants respectfully submit that claims 6 and 17-19 are enabled by the specification and request that the Examiner's rejections of these claims under 35 U.S.C. § 112, first paragraph, be withdrawn.

In the Office Action, claims 11-13, 17-19, and 23-25 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

With regard to claims 11-13, the Examiner alleges that the limitations set forth in claim 11 are unclear. The Examiner further rejected claims 12-13 as being dependent upon a rejected base claim. Applicants have amended claim 11 to clarify the limitation and request that the Examiner's rejections of claims 11-13 under 35 U.S.C. § 112, second paragraph, be withdrawn.

With regard to claims 17-19, the Examiner alleges that one is not able to determine meaning of "an estimate." The Examiner further rejected claims 18-19 as being dependent upon a rejected base claim. Applicants respectfully disagree with the Examiner's allegations. Techniques for determining an autocorrelation of channel estimates on a reverse link are described at least in lines 23-32 on page 9 of the specification. Applicants respectfully request that the Examiner's rejections of claim 17-19 under 35 U.S.C. § 112, second paragraph, be withdrawn.

With regard to claims 23-25, the Examiner alleges that the language "their complex numbers" in claim 23 is indefinite. The Examiner further rejected claims 24-25 as being dependent upon a rejected base claim. Claim 23 has been amended. Applicants respectfully request that the Examiner's rejections of claim 23-25 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In the Office Action, claims 8, 9, 14, and 15 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Harrison (U.S. Patent No. 6,154,485). The Examiner's rejections are respectfully traversed.

Harrison is concerned with receiving signals using combined orthogonal transmit diversity and adaptive array techniques. Harrison describes a coefficient  $\alpha$  that may allow a base transmitter to smoothly transition between orthogonal transmit diversity mode and adaptive array mode. This smooth transition may allow the base transmitter to smoothly disable the adaptive array mode in proportion to the degradation of the quality of feedback data from a receiver. See Harrison, col. 8, ll. 23-35.

However, Harrison does not describe or suggest determining a code correlation parameter ( $\lambda$ ) based on an auto-correlation of a channel estimate, as set forth in independent claim 8. For at least this reason, Applicants respectfully submit that claim 8, and claims 9, 14, and 15 depending therefrom, are not anticipated by Harrison. Applicants request that the Examiner's rejections of claims 8, 9, 14, and 15 under 35 U.S.C. § 102(e) be withdrawn.

In the Office Action, claims 1, 2, 4, and 5 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Harrison. Claims 3, 7, and 20 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Harrison in view of Alamouti (U.S. Patent No. 6,185,258). Claim 10 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Harrison in view of Dabak, et al (U.S. Patent No. 6,594,473). The Examiner's rejections are respectfully traversed.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. As discussed above, Harrison describes a coefficient  $\alpha$  that may allow a base transmitter to smoothly transition between orthogonal transmit diversity mode and adaptive array mode. However, Harrison is completely silent with regard to generating a transformation matrix  $L$  based on an auto-correlation of a channel estimate, as set forth in independent claims 1 and 4. Moreover, as admitted by the

Examiner, Harrison does not explicitly disclose an orthogonal code matrix, as set forth in independent claims 1 and 4. Harrison is also completely silent with regard to determining a code correlation parameter ( $\lambda$ ) based on an auto-correlation of a channel estimate, as set forth in independent claim 8. Claims 10 and 20 depend from independent claim 8.

The Examiner relies upon Alamouti to describe generation of an orthogonal code matrix. The Examiner also relies upon Dabak to describe a complex beamforming weight parameter having a magnitude and a phase. However, neither of these references remedy the aforementioned fundamental deficiencies of the primary reference. Moreover, none of the cited references provide any suggestion or motivation to modify the prior art to arrive at Applicants claimed invention. For at least the aforementioned reasons, Applicants respectfully submit that the present invention is not obvious over Harrison, Alamouti, or Dabak, either alone or in combination. Applicants request that the Examiner's rejections of claims 1-5, 7, 10, and 20 under 35 U.S.C. 103(a) be withdrawn.

In the Office Action, claims 21 and 26 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Karabinis (U.S. Patent No. 4,780,884). The Examiner's rejection is respectfully traversed.

Karabinis describes a modulator that may combine signals with different phases. However, Karabinis is completely silent with regard to determining first and second complex numbers based upon an autocorrelation of a channel estimate, as set forth in independent claim 21. Karabinis is also completely silent with regard to determining first and second phases based upon an autocorrelation of a channel estimate, as set forth in independent claim 26. For at least the aforementioned reasons, Applicants respectfully submit that the invention set forth in claims

21 and 26 is not obvious in view of Karabinis and request that the Examiner's rejections of claims 21 and 26 under 35 U.S.C. 103(a) be withdrawn.

New independent claim 28 sets forth a method of encoding information symbols for multiple antennae transmission. The method includes determining a plurality of orthogonal codes, estimating at least one autocorrelation of at least one channel, and determining an amount of the beamforming relative to an amount of orthogonal coding and signals transmitted from the multiple antenna based upon the plurality of orthogonal codes and the at least one autocorrelation. As discussed above, the cited references fail to describe or suggest, and provide no motivation for, estimating at least one autocorrelation of at least one channel. For at least this reason, Applicants respectfully submit that new claims 28-36 are not anticipated by or obvious over the cited references.

For the aforementioned reasons, it is respectfully submitted that all claims pending in the present application are in condition for allowance. The Examiner is invited to contact the undersigned at (713) 934-4052 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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